

Reply to the Letter to the Editor: Stem Cells Combined With Platelet-rich Plasma Effectively Treat Corticosteroid-induced Osteonecrosis of the Hip: A Prospective Study

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To the Editor,

We thank Dr. Piuze for his thoughtful critique of our study. He is correct in noting that the nomenclature for the definition of mesenchymal stem cells (MSCs) needs to be standardized, and although not explicitly stated in the methods section of the study that Dr. Piuze commented on [5], our previous studies, which describe our technique for isolating MSCs [5, 6, 10], meet the criteria proposed by the Mesenchymal and Tissue Stem Cell Committee of the International Society for Cellular Therapy to define human mesenchymal stromal/stem cells.

Dr. Piuze is correct in pointing out that the bone marrow concentrate (BMC) isolated in the aspirate contains

several different cell types and only a small percentage are true MSCs. However, we have isolated and characterized this subpopulation of cells from BMC in our previous studies [5, 6, 10], and we are currently in the process of performing a prospective randomized clinical trial (clinicaltrials.gov: [NCT03269409](#)) to build upon our knowledge of the unaltered BMC at the time of surgery. Indeed, we will soon be able to determine exactly how much of every cell type is derived during each core decompression including MSCs, vascular progenitors, macrophages, and lymphocytes. Likewise, we are also harvesting adipose-derived MSCs to determine if they will have a greater impact

on healing, as our in vitro study has suggested [10].

Dr. Piuze notes that many studies have focused on MSCs [1, 2, 4-10], and we agree that other cell types may be important as well, which is why our current clinical trial is exploring them. Still, MSCs are the focus because the evidence suggests that they are the key regenerative cell population in adjuvant biologic therapies such as BMC [3].

We thank Dr. Piuze for his contributions to the clinical field of regenerative orthopaedic surgery. We agree that high-quality studies, with quantitative methods for cell harvesting, processing, characterization, and delivery, are important. We would like

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to add that studies examining clinical and structural outcomes, while still needed, are a primary focus of our currently enrolling prospective randomized clinical trial.

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